U.S. Army Corps of Engineers
Wilmington District

Currituck Sound Coordination Meeting

Plan Formulation and Incremental Cost Analysis

October 25, 2006

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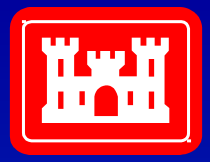
PURPOSE: To identify ways to improve water quality and restore the Currituck Sound.

The Major Phases of Civil Works Project Development are:

- Reconnaissance Planning
- Feasibility Planning
- Preconstruction Engineering & Design (PED)
- Construction and/or Implementation of Management Measures
- Operation & Maintenance (OMRR&R)



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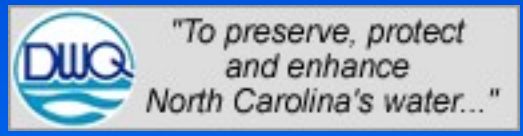
ncwildlife.org
North Carolina
Wildlife
RESOURCES COMMISSION
The best resource for hunting, fishing and boating information, educational programs, WILD products, and other wildlife services for the citizens and visitors of North Carolina.



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ER 1105-2-100, APPENDICES

- A - References
- B - Public Involvement
  - Public Involvement, Collaboration and Coordination Requirements
  - Public Involvement Strategy
  - Study Management Coordination

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ER 1105-2-100, APPENDICES

- C - Environmental Evaluation & Compliance
  - Procedures for Environmental Evaluation (EQ Acct)
  - Ecological, Cultural, Aesthetic Resources
  - Water Quality and Related Requirements
  - Air Quality and Related Requirements
- D - Economic and Social Considerations
  - Economic Considerations – general, applicable to all civil work missions
  - Social Effects

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- E - Civil Works Missions & Evaluation Procedures (for each mission):
  - Federal interest
  - Types of improvements
  - Specific policies
  - NED & NER benefits evaluation procedures
  - Cost sharing
- F - Continuing Authorities (CAP)
- G - Planning Reports and Programs
- H - Review & Approval of Decision Documents

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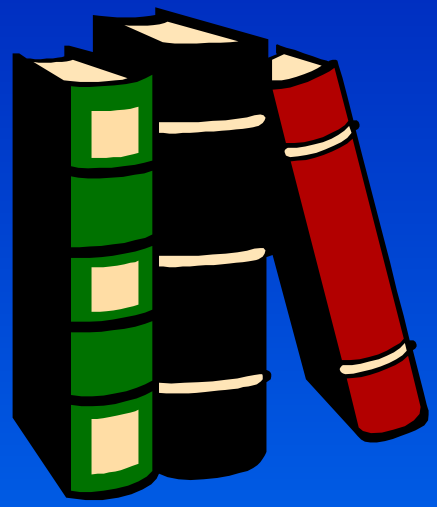
PROCEDURAL GUIDANCE

- Research Reports
- Manuals
- Engr. Pamphlets
- Engr. Technical Letters
- Division/Districts



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Corps Planning Process: Six Steps

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How To Quantify Benefits

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- **Inventory and Forecast Conditions**
  - Historic
  - Existing
  - Base and target years
  - Future without project
  - Future with project
- **Compare and Evaluate**
  - Use models to determine quality
  - Define area of impact

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Available Models

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- HSI –Habitat Suitability Indices
- FQA – Floristic Quality Assessment
- HGM – HydroGeoMorphic Approach
- IBI – Index of Biotic Integrity
- QHEI – Qualitative Habitat Evaluation Index
- Island Community Model
- Oyster Models – under development

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Quantifying Benefits

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- Ecosystem restoration evaluation process focuses on quantitative and qualitative restoration outputs
- Monetary benefits are usually incidental
- Policy dictates that ecosystem outputs must be clearly identified and quantified in appropriate units
- Units that measure an

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Plan Comparison

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TRADITIONAL OUTPUTS

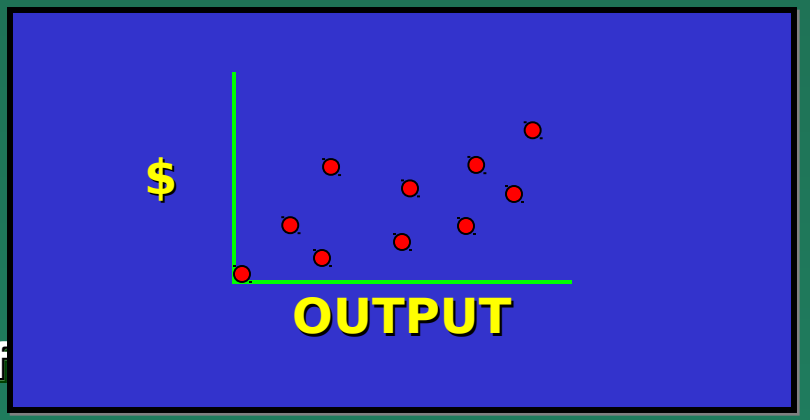
- Compare costs and benefits
- Traditional benefits measured in $

BC Ratio = $ Benefits/$ Costs

Net Benefits = $ Benefits - $ Costs

ENVIRONMENTAL OUTPUTS

- **Environmental benefits not in $**
- **Therefore no B/C or net benefits**
- **Can still compare costs and benef**



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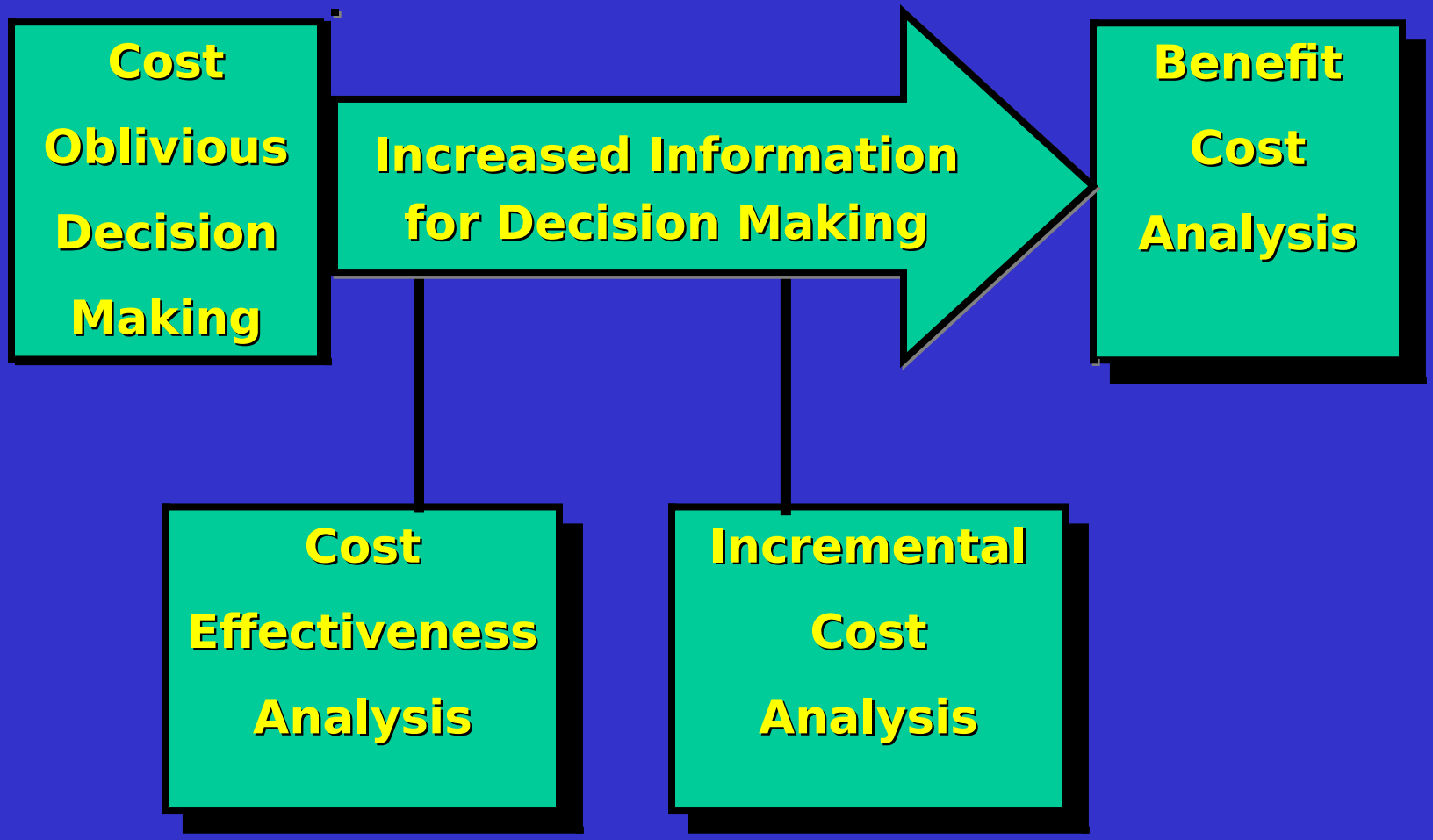
- Software version of CE/ICA procedures
- Automates tedious math
  - Allows you to do more complicated analyses
- Tables & graphs as record of analyses


Cost Oblivious Decision Making
Increased Information for Decision Making
Benefit Cost Analysis
Cost Effectiveness Analysis
Incremental Cost Analysis

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Plan Comparison

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Alternative Restoration Plans	Plan Outputs
No Action Plan	0 Habitat Units
Green Plan	950 Habitat Units
Blue Plan	950 Habitat Units
Red Plan	1,000 Habitat Units

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Plan Comparison

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Alternative Restoration Plans	Plan Outputs	Plan Costs
No Action Plan	0 Habitat Units	$0
Green Plan	950 Habitat Units	$ 500,000
Blue Plan	950 Habitat Units	$ 750,000
Red Plan	1,000 Habitat Units	$1,000,000

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Plan Comparison

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Alternative Restoration Plans	Plan Outputs	Plan Costs
No Action Plan	0 Habitat Units	$0
Green Plan	950 Habitat Units	$ 500,000
Red Plan	1,000 Habitat Units	$1,000,000

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Best Buy Plans:

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- Subset of cost effective plans
- Most efficient in production
- Greatest increases in output for least increases in cost
- Lowest incremental costs per unit of output

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Corps Planning Process: Six Steps

Lessons related to planning step #1:

- Avoid Poorly specified objective
- Objectives not really “ecosyste restoration”
- Objectives not focused on significant resources

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Planning Objectives

- **Objectives that are not really "ecosystem restoration"**
  - **Creation of non-indigenous habitat**
    - ***Example - creation of trout habitat in a naturally warm water fishery***
  - **Creation of non-sustaining habitat**
    - ***Example- only a few miles "restored" because all downstream water consumed by agricultural uses***
- **Objectives that are not focused on significant resources**
  - **Or significance is not explained**

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Lessons related to planning step #2:

- Use of ecosystem approaches/models not suited to planning objectives
- Poor selection of “indicator”/output species
- Using multiple outputs, combining outputs
- Successful practices w/ environmental outputs
- Future without project conditions

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Lessons related to planning step #3:

- Alternatives don't meet 1 or more objectives
- Carrying unsatisfactory alternatives through the analyses
- How many alternatives do you need?
- Consider multiple scales/measures/sites

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Plan Formulation

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- **How many alternatives do you need?**
  - **It depends!**
  - ***Lesson: consider reasonable number of alternatives***
- **Not considering multiple scales for multiple measures and/or sites**
  - ***Lesson: consider multiple scales for measures/ sites***
  - ***Lesson: a group of sites (all considered at only 1 scale) doesn't really meet the "spirit" of production efficiency***

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Currituck Sound Feasibility Study

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QUESTIONS

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